

AQUATIC BIODIVERSITY ASSESSMENT FOR THE MAINTENANCE MANAGEMENT PLAN FOR MORKEL'S COTTAGE, STRAND IN CAPE TOWN

JULY 2024



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1. SPECIALIST DETAILS, EXPERTISE AND DECLARATION

1.1. QUALIFICATIONS OF SPECIALIST CONSULTANT

Name: Antonia Belcher
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 Email: toni@bluescience.co.za
Profession: Aquatic Scientist (P. Sci. Nat. 400040/10)
Fields of Expertise: Specialist in freshwater assessments, monitoring and reporting
Years in Profession: 30+ years

Toni Belcher worked for the Department of Water Affairs and Forestry for more than 17 years. During this period she worked for the Directorate Water Quality Management, the Institute for Water Quality Studies and the Western Cape Regional Office and has built up a wide skills base on water resource management and water resource quality for rivers, estuaries and the coastal marine environment. Since leaving the Department in 2007, she has been working in her private capacity and was co-owner of BlueScience (Pty) Ltd, working in the field of water resource management and has been involved in more than 500 aquatic ecosystem assessments for environmental impact assessment and water use authorisation purposes. In 2006 she was awarded a Woman in Water award for Environmental Education and was a runner up for the Woman in Water prize for Water Research.

Professional Qualifications:

1984 Matriculation Lawson Brown High School
 1987 B.Sc. – Mathematics, Applied Mathematics University of Port Elizabeth
 1989 B.Sc. (Hons) – Oceanography University of Port Elizabeth
 1998 M.Sc. – Environmental Management (cum laude) Potchefstroom University

Key Skills: Areas of specialisation: Aquatic ecosystem assessments, Monitoring and evaluation of water resources, Water resource legislation and authorisations, River classification and Resource Quality Objectives, River Reserve determination and implementation, Water Quality Assessments, Biomonitoring, River and Wetland Rehabilitation Plans, Catchment management, River maintenance management, Water education.

Summary of Experience:

1987 – 1988	Part-time field researcher, Department of Oceanography, University of Port Elizabeth
1989 – 1990	Mathematics tutor and administrator, Master Maths, Randburg and Braamfontein Colleges, Johannesburg
1991 – 1995	Water Pollution Control Officer, Water Quality Management, Department of Water Affairs, Pretoria
1995 – 1999	Hydrologist and Assistant Director, Institute for Water Quality Studies, Department of Water Affairs and Forestry, Pretoria
1999 – 2007	Assistant and Deputy Director, Water Resource Protection, Western Cape Regional Office, Department of Water Affairs, Cape Town
2007 – 2012	Self-employed – Aquatic Specialist
2013 – 2020	Senior Aquatic Specialist and part-owner, BlueScience
2020 – present	Self-employed – Aquatic Specialist

1.2. DECLARATION OF INDEPENDENCE

I, **Antonia Belcher**, as the appointed specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
 - other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
 - ~~am not independent, but another specialist that meets the general requirements set out in Regulation 13 of GN No. 326 have been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- in terms of the remainder of the general requirements for a specialist, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- have disclosed/will disclose, to the Applicant, the Department and registered interested and affected parties, all material information that have or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application;
- have ensured/will ensure that information containing all relevant facts in respect of the application was/will be distributed or was/will be made available to interested and affected parties and the public and that participation was/will be facilitated in such a manner that all interested and affected parties were/will be provided with a reasonable opportunity to participate and to provide comments;
- have ensured/will ensure that the comments of all interested and affected parties were/will be considered, recorded and submitted to the Department in respect of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations, 2014 (as amended).

Date: 14 June 2024

Name of company: BlueScience (Pty) Ltd

Signature of the specialists:



2. INTRODUCTION

2.1. SCOPE OF STUDY

The City of Cape Town (CCT) is planning to conduct repairs and periodic maintenance work on the bulk water pipeline situated within the Morkel's Cottage area between Strand and Gordon's Bay in Cape Town (Figure 1). The bulk water main pipeline supplies potable water within the CCT and connect to the water treatment works, dams and other water sources. It also connects to the CCT's potable water reticulation system. The pipeline occurs within an existing 12-meter-wide servitude works area includes the bulk waterline within a servitude area that traverses residential areas such as Onverwacht, Rusthof, Forbes and Broadlands Village.

The proposed works would entail excavations and opening along the pipeline length in stages to caulk the joints on the 810mm diameter pipeline. Pipeline repairs and maintenance work will be restricted to the 12-meter-wide servitude area. All work requirements including the movements of persons, essential vehicles and use of machinery will be limited to this demarcated working area.

A Maintenance & Management Plan (MMP) would be required for necessary repairs along the pipeline, and to make provision for a long-term maintenance of the bulk water pipeline works near the Morkel's Cottage informal settlement. As such, Zutari is undertaking the requisite MMP to authorise the proposed maintenance activities. This report assesses any aquatic features within and adjacent to the pipeline and considers the proposed maintenance activities as well as provides mitigation recommendations for the proposed works.

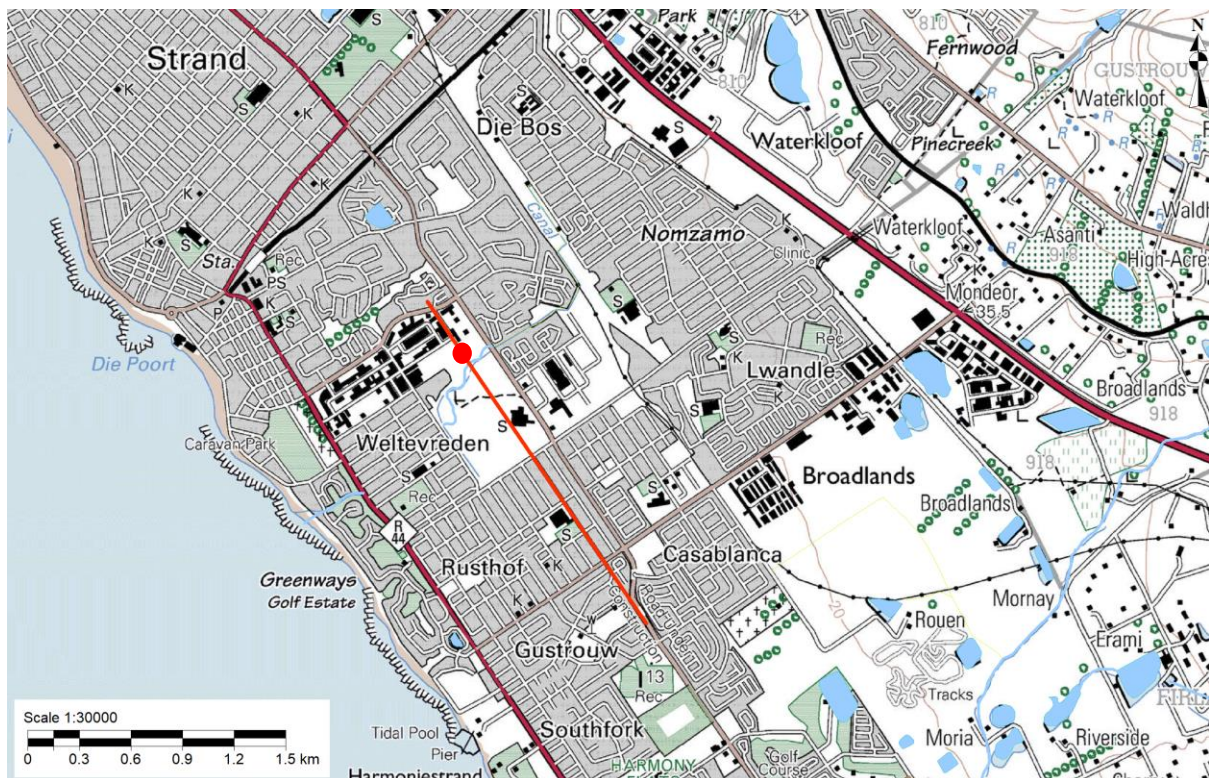


Figure 1. A topographical map of the study area, indicating the locality of the pipeline (red line), with the location of the scour valves indicated by the red dot.

Table 1. Key information related to the water resources which may be impacted by the proposed activities

Descriptor	Name / details	Notes
Water Management Area	Breedee Olifants WMA	
Catchment Area	Soet River	
Quaternary Catchment	G22K	
Present Ecological State (PES)	E (Seriously modified)	DWAF 2012 (Appendix C) for the adjacent Sir Lowry's Pass River
Ecological Importance and Ecological Sensitivity (EI&ES)	Ecological Importance – Moderate Ecological Sensitivity – High	
Water resource component potentially impacted	Minor watercourse and wetlands	
Latitude	34° 7'15"S	Location of the pipeline crossing the Soete River
Longitude	18°50'46.5"E	

The study site lies within a wider area considered of low Aquatic Biodiversity Combined Sensitivity. The Soet River and associated floodplain wetland habitat crossed by the pipeline are mapped as being of very high sensitivity. The wetland area is mapped as an aquatic Critical Biodiversity Area (CBA). The site is also located within a Strategic Water Source Area for surface water (Boland). The mapped aquatic features are discussed in Section 3.6 of this report. It is highly unlikely that the activities proposed would impact the Strategic Water Source Area. The potential impact of the activities on the wetland areas at the site is assessed in this report. The acceptability of the proposed maintenance works and recommended mitigation measures are included in Section 6 of the report.

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

**Figure 2. DFFE Screening Tool Aquatic Biodiversity Combined Sensitivity mapping for the site.**

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	CBA 1: Aquatic
Very High	Wetlands_Southwest Fynbos Bioregion (Floodplain)

2.2. TERMS OF REFERENCE

The Terms of Reference for this specialist freshwater screening assessment are as follows:

1. Identify, characterise, and delineate aquatic ecosystems on the site; determine their sensitivity and ecological importance and provide recommendations on constraints to development.
2. Undertake an Aquatic Impact Assessment (in terms of the EIA process) and Aquatic Risk Assessment in terms of Section 21 (c) and (i) uses
 - Site visit with wetland/watercourse extent zonation delineations, Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) assessments
 - Impact Assessment and Risk Matrix
3. Indicate the acceptability of the proposed maintenance work from a freshwater ecological perspective.
4. Recommend any mitigation measures to avoid and/or minimise impacts and/or optimise benefits associated with the proposed maintenance works.

2.3. METHODOLOGY AND LIMITATIONS OF THE STUDY

Input into this report was informed by a combination of desktop assessments of existing freshwater ecosystem information for the study area and catchment, as well as a site visit on 6 June 2024, in the winter rainfall period, enabling the onsite detection of seasonal wetland elements.

During the field visit, the characterisation and integrity assessments of the freshwater features were undertaken. Mapping of the freshwater features was undertaken using GPS Tracker and mapped in Google Earth Professional. Past imagery of the site was also consulted to determine past land use and modification activities that have taken place within the site.

The South African National Biodiversity Institute (SANBI) Biodiversity GIS and Cape Farm Mapper websites were consulted to identify any constraints in terms of fine-scale biodiversity conservation mapping as well as possible freshwater features mapped in the Freshwater Ecosystem Priority Areas maps. This information/data was used to inform the resource protection-related recommendations.

Limitations and uncertainties often exist within the various techniques adopted to assess the condition of ecosystems. The following techniques and methodology were utilized to undertake this study:

- Analysis of the freshwater ecosystems was undertaken at a rapid level and did not involve detailed habitat and biota assessments;
- The river health assessment was carried out using the South African Department of Water and Sanitation developed methodologies. River Health assessments were carried out to provide information on the ecological condition and ecological importance and sensitivity (EIS) of the river systems impacted.
- The guideline document, “A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas” document, as published by DWAF (2005) was followed for the delineation of the riparian and wetland areas.
- The wetlands were subsequently classified according to their hydro-geomorphic determinants based on a classification system devised by Kotze *et al* (2004) and SANBI (2009). Notes were made on the levels of degradation in the wetlands based on field experience and a general understanding of the types of systems present.

- A Present Ecological State (PES) assessment was conducted for each hydro-geomorphic wetland unit identified and delineated within the study area.
- The functional wetland assessment technique, WET-EcoServices, developed by Kotze *et al* (2009) was used to indicate the ecological benefits and services provided by delineated wetland habitats. This technique consists of assessing a combination of desktop and infield criteria to identify the importance and level of functioning of the wetland units within the landscape.
- The EIS was conducted according to the guidelines developed by DWAF (1999).

The level of aquatic assessment undertaken was considered to be adequate for this study.

2.4. USE OF THIS REPORT

This report reflects the professional judgment of its authors. The full and unedited content of this should be presented to the client. Any summary of these findings should only be produced in consultation with the authors.

3. DESCRIPTION OF THE STUDY AREA

3.1 VISUAL CHARACTERISTICS AND TOPOGRAPHY

The site is located in an area referred to as Morkel's Cottage on the floodplain between Strand and Gordon's Bay, within the Helderberg Basin. The horizon is dominated by the Hottentot's Holland Mountain Range (Figure 3) where all the watercourse that drains onto the floodplain within the basin originate. The area is located on the valley floor and floodplain of the Soet River, a river that is highly modified and transformed by the surrounding urban development.

The topography is very flat, sloping gently to the southwest and False Bay. The area surrounding the site comprises residential, the Stand Senior Secondary School and sports fields. There is encroachment of informal housing into the remaining open space to the south of the pipeline.



Figure 3. A view of the open space through which the pipeline passes, looking northwards towards the Helderberg and Hottentot's Holland Mountains

The nearby open space approximately 1.5 km to the southeast comprises the Harmony Flats Nature Reserve of the City of Cape Town which was originally established to preserve habitat for geometric tortoise (*Psammobates geometricus*), now locally extinct. The reserve does however still protect Lourensford Alluvium Fynbos and its associated fauna and flora. Local volunteers and community organisations protect and manage the reserve.

3.2. CLIMATE

The area has a Mediterranean climate. Summers are typically hotter, drier, and have greater evaporation rates, while winters are cold and wet (Figure 4). On average, the area receives approximately 834mm of rainfall per year. The run-off and the resulting flow within the Sir Lowry's Pass River, as well as the inundation in the wetlands on the site, is thus higher during winter (June to October). This is an important consideration when planning the repairs and maintenance of the existing infrastructure which is close to any of the watercourses. By conducting the works during summer (November/December to March/April), the impacts can be greatly reduced.

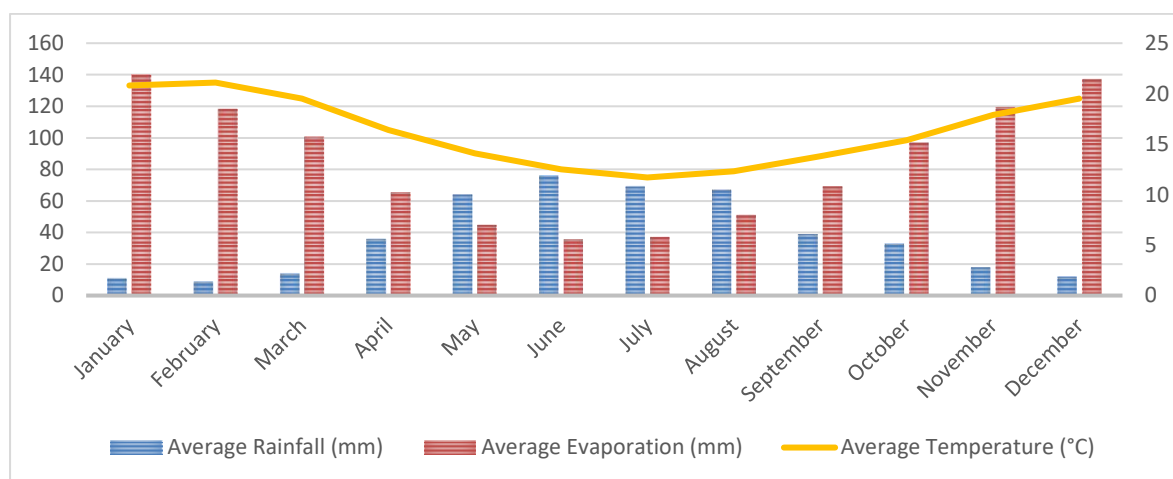


Figure 4. Average rainfall, Evaporation and temperature graphs for the area between 1950 and 2000

3.3. GEOLOGY AND SOIL

The geology of the area is predominantly surficial cover formed in situ on Malmesbury rocks, with occasional quaternary quartz sand of the Springfontein Formation. The soils are mapped as plinthic catena- these are undifferentiated upland duplex or marginal soils (Figure 5). The soils have a strong texture contrast and have a marked clay accumulation that is conducive to wetland formation. The soils are strongly structured, lack red colouration and are considered to have a high erodibility potential, although this is minimized by the flat gradient on site.

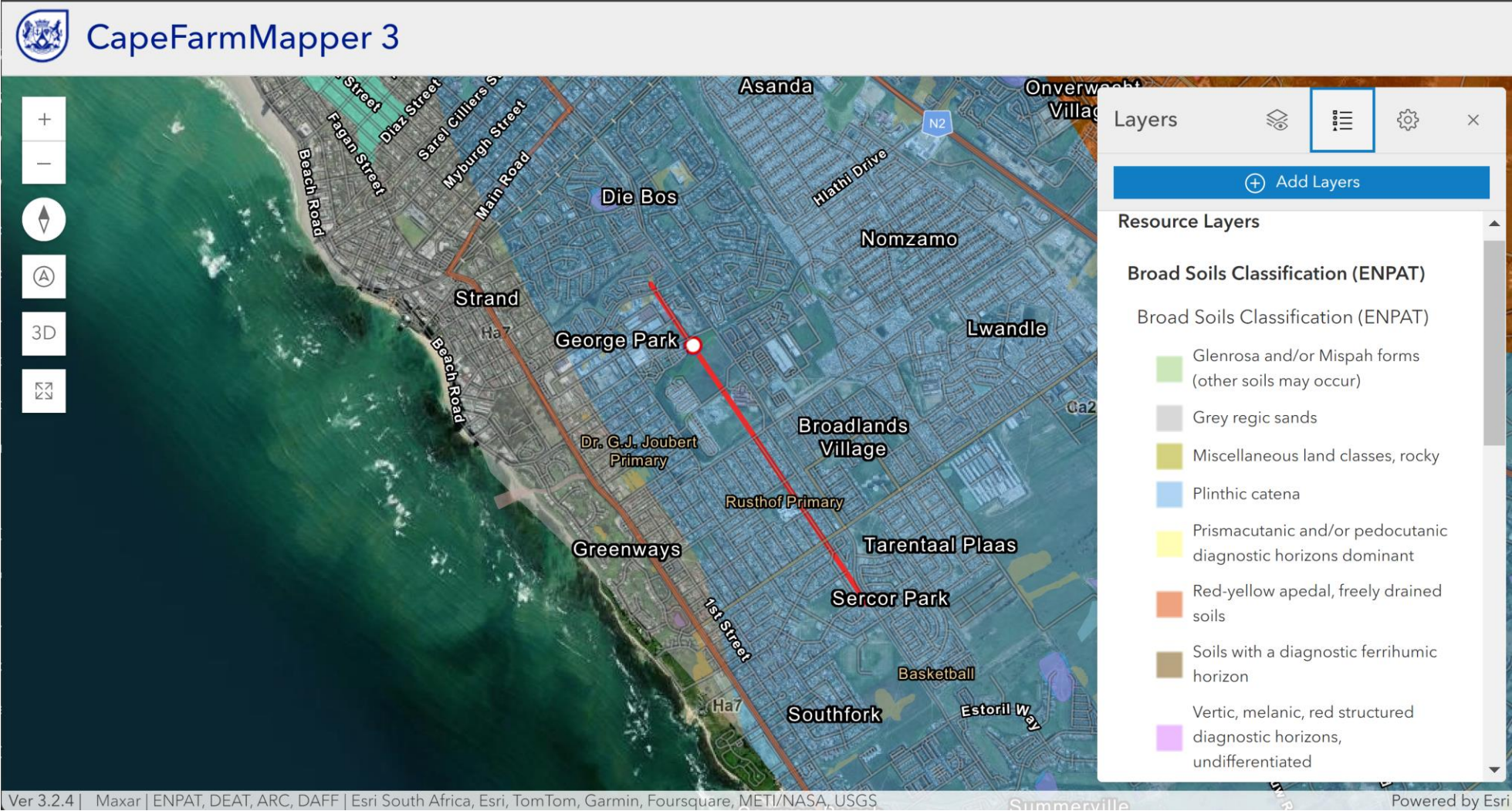


Figure 5. Soil Classification map for the pipeline (red line) (ENPAT data obtained from CapeFarmMapper, 2024)

3.4. FLORA

Mucina and Rutherford (2006) mapped the natural vegetation types in South Africa on a national scale. Where indigenous vegetation has been significantly removed, the mapping of vegetation was guided by variables such as soil type. Due to the large scale at which this mapping was conducted, the finer scale boundaries of mapped units are often not always very accurate. The mapping has been updated by the South African National Biodiversity Institute (SANBI) in 2009, 2012 and 2018. Figure 6 shows the 2018 update of the mapping of Mucina and Rutherford (2006).

The natural vegetation that would have mostly occurred on the site is mapped as Lourensford Alluvium Fynbos which occurs on the low-lying plains of the Somerset West – Strand – Gordons Bay Area. It is a medium-density low shrubland with a short graminoid understory. It is rich in geophytes in places. Due to the high level of development within the catchment, both agricultural and urban, 90% of the natural extent of this vegetation type has been transformed. It is therefore considered to be Critically Endangered.

Today, there is very little to no indigenous vegetation cover remaining in the study area and the vegetation at the proposed development site comprises primarily grassed areas. The adjacent Harmony Flats Nature Reserve is, however, a protected area that contains a remnant of the natural vegetation cover and is being rehabilitated. Plants occurring within the site include *Leucadendron lanigerum* var. *lanigerum*, *Wachendorphia paniculata*, *Elegia recta*, *Hypodiscus rugosus*, *Thamnochortus fruticosus*, *Ficinia lateralis*, *Watsonia meriana*, *Monsonia speciosa*, *Paulidia alba*, *Lachenalia orchioides orchioides*, *L. lutea*, *Babiana augustifolia*, *Ixia versicolor*, *Oedera capensis*, *Pelargonium triste*, *Seriphium plumosum*, *Asparagus rubicundus*, *Helichrysum crispum*, *Ammocharis longifolia*, *Agathosma* sp., *Geissorhiza juncea*, *Bartholina burmanniana*, *Themeda triandra*, *Cenchrus caudatus* and *Tribolium uniolae*. Indigenous plants occurring specifically in the wetter areas in the south of the site include *Ornithogalum thursoides*, *Drosera cistiflora*, *Paulidia aquatica*, *Isolepis* spp., *Pycnus polystachyos* and *Juncus cephalotes*. Invasive alien vegetation within the site includes *Pennisetum clandestinum* and *Echium plantagineum*.



Figure 6. Vegetation map for the pipeline (red line) (South African National Biodiversity Institute. 2018 Vegetation Map App [Vector] obtained from CapeFarmMapper 2024)

3.5. AQUATIC FEATURES

The mapped aquatic feature within the site comprises a floodplain wetland associated with the Soete River. This mapping occurs in the National Wetland Map (version 5) and the City of Cape Town's (CCT) Biodiversity Network wetland mapping. Drainage into the wetlands is via a constructed stormwater channel while flow exists in the area via a stormwater pipeline. Most of the Soet River is no longer open to the surface but drains with stormwater pipelines and only surfaces near the mouth in the Greenways Golf Estate. The aquatic features assessed during the site visit are further described in Section 7.

3.6. CONSERVATION VALUE OF THE FRESHWATER FEATURES

Four sets of conservation mapping at a national, provincial and local scale are of relevance to the identification of aquatic features of ecological and biodiversity conservation importance. These are the National Freshwater Ecosystem Priority Areas (NFEPA) map, the National Wetland Map (version 5) (NWM5), the 2017 Western Cape Biodiversity Spatial Plan (WCBSP) and the 2017 City of Cape Town Biodiversity Network and Wetland mapping.

NFEPA's are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting the sustainable use of water resources. FEPA's were determined through a process of systematic biodiversity planning and were identified using a range of criteria for serving ecosystems and associated biodiversity of rivers, wetlands and estuaries. The river and wetland FEPA's are required to be maintained in a largely natural ecological state while Fish Support Areas should not be allowed to degrade from their existing ecological condition. The Sir Lowry's Pass River catchment, in which the site is located, is mapped as a Fish Support Area (Figure 10) due to the population of *Galaxias zebratus* it supports. There are no FEPA Wetlands mapped within or adjacent to the site. The floodplain wetlands in the site have however been mapped in the NWM5 mapping as natural wetland areas (Figure 7).

The WCBSP and Cape Town Biodiversity Network Map aim to guide sustainable development by providing a synthesis of biodiversity information to decision-makers. The map indicates areas of land as well as aquatic features which must be safeguarded in their natural state if biodiversity is to persist, and ecosystems are to continue functioning. The main map categories are Critical Biodiversity Areas (CBAs) (Terrestrial and Aquatic), Ecological Support Areas (ESAs)(Critical and Other), Other Natural Remaining Areas and No Natural Remaining Areas. The first two mentioned categories represent the biodiversity priority areas that should be maintained in a natural to a near-natural state. The last two mentioned categories are not considered priority areas and a loss of biodiversity within these areas may be acceptable. Most of the WCBSP mapping was adopted from the City Biodiversity Network Map as the more detailed level of mapping undertaken. There are aquatic and terrestrial CBAs mapped within Morkel's Cottage associated with remnant terrestrial vegetation and the floodplain wetlands (Figures 8 and 9).

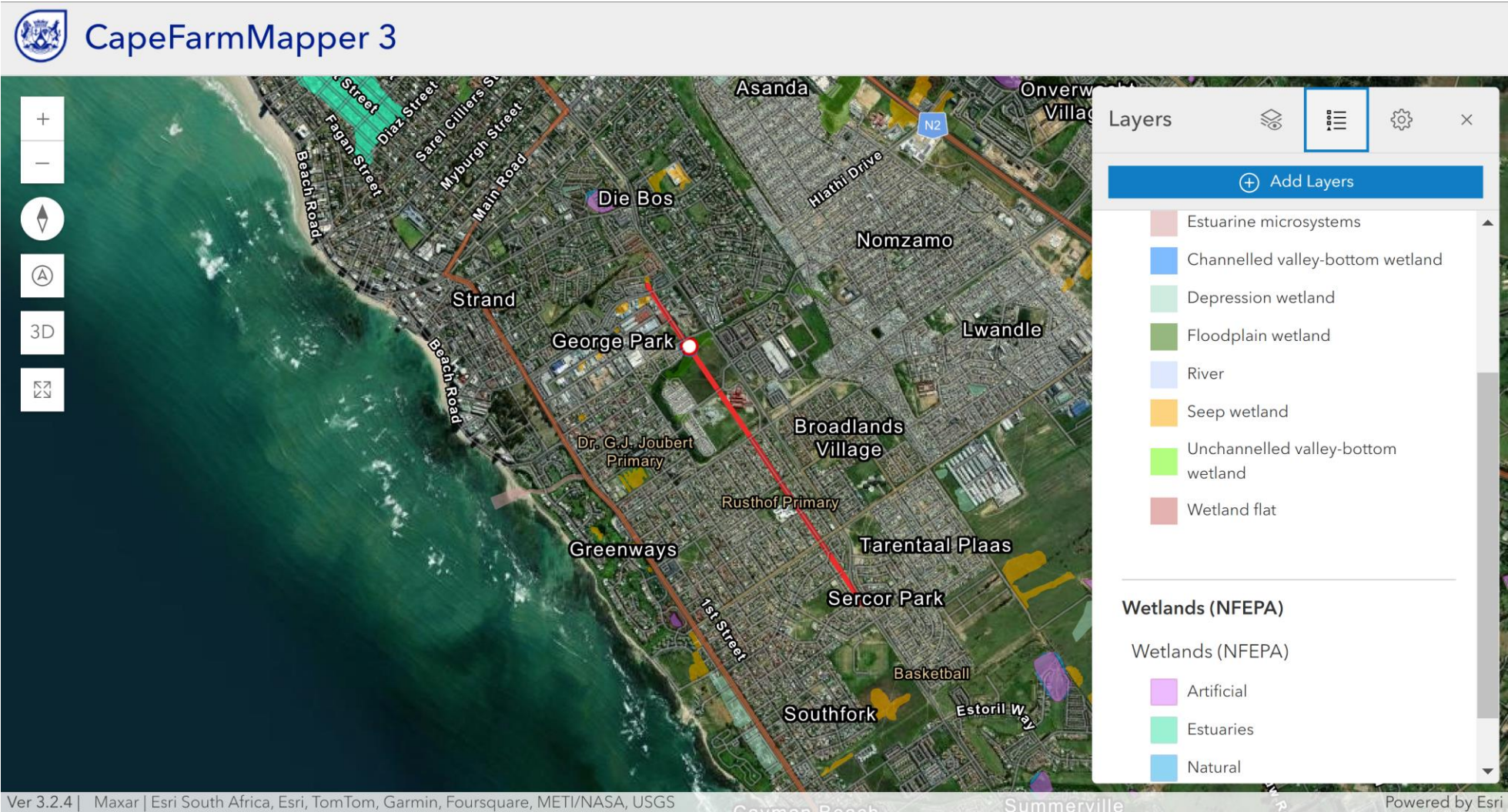


Figure 7. National Freshwater Ecosystem Priority Area and National Wetland Map 5 mapping for the site (red line) (obtained from CapeFarmMapper 2024)

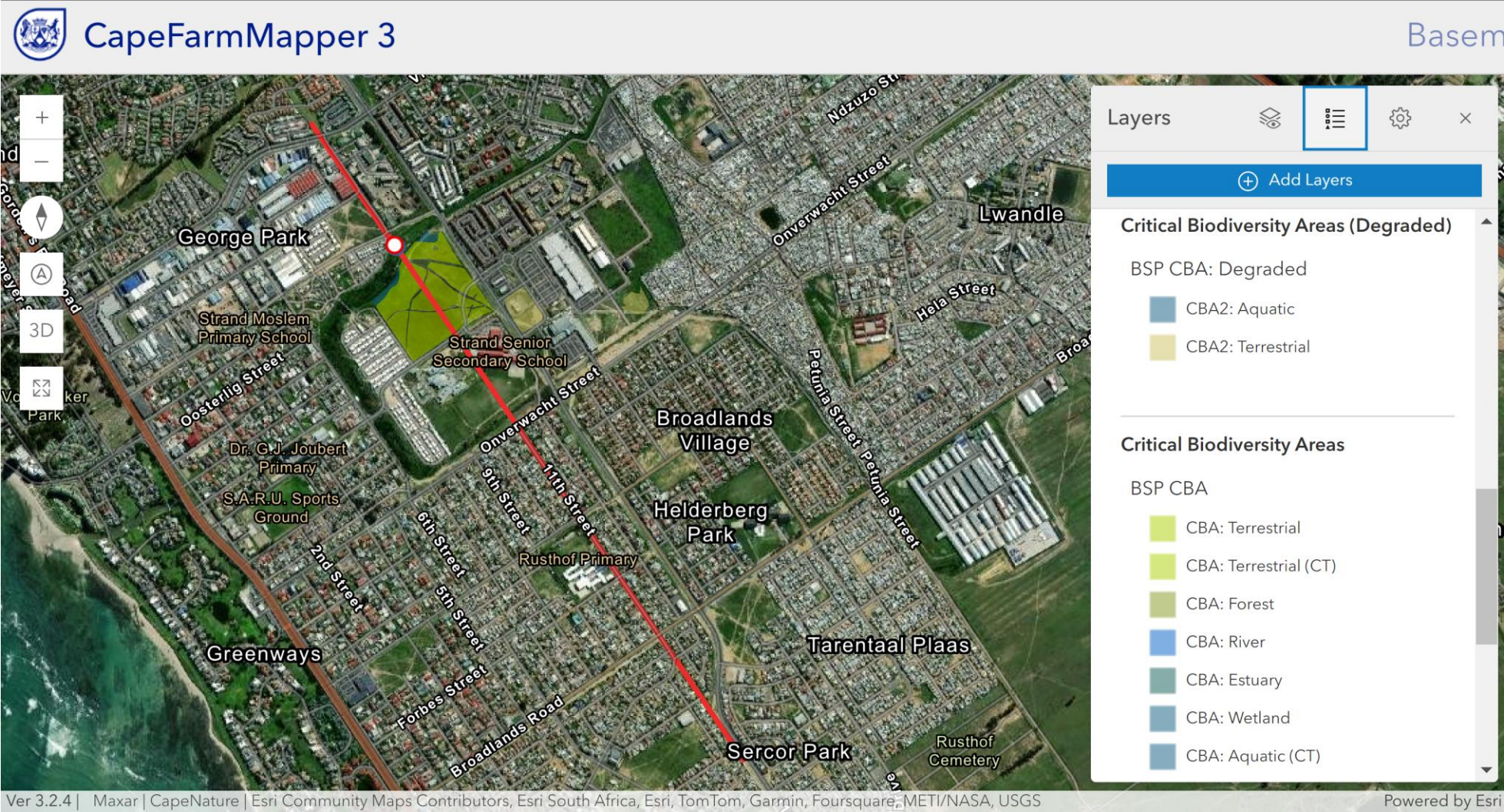


Figure 8. Western Cape Biodiversity Spatial Plan mapping for the site (red line) (obtained from CapeFarmMapper 2024)

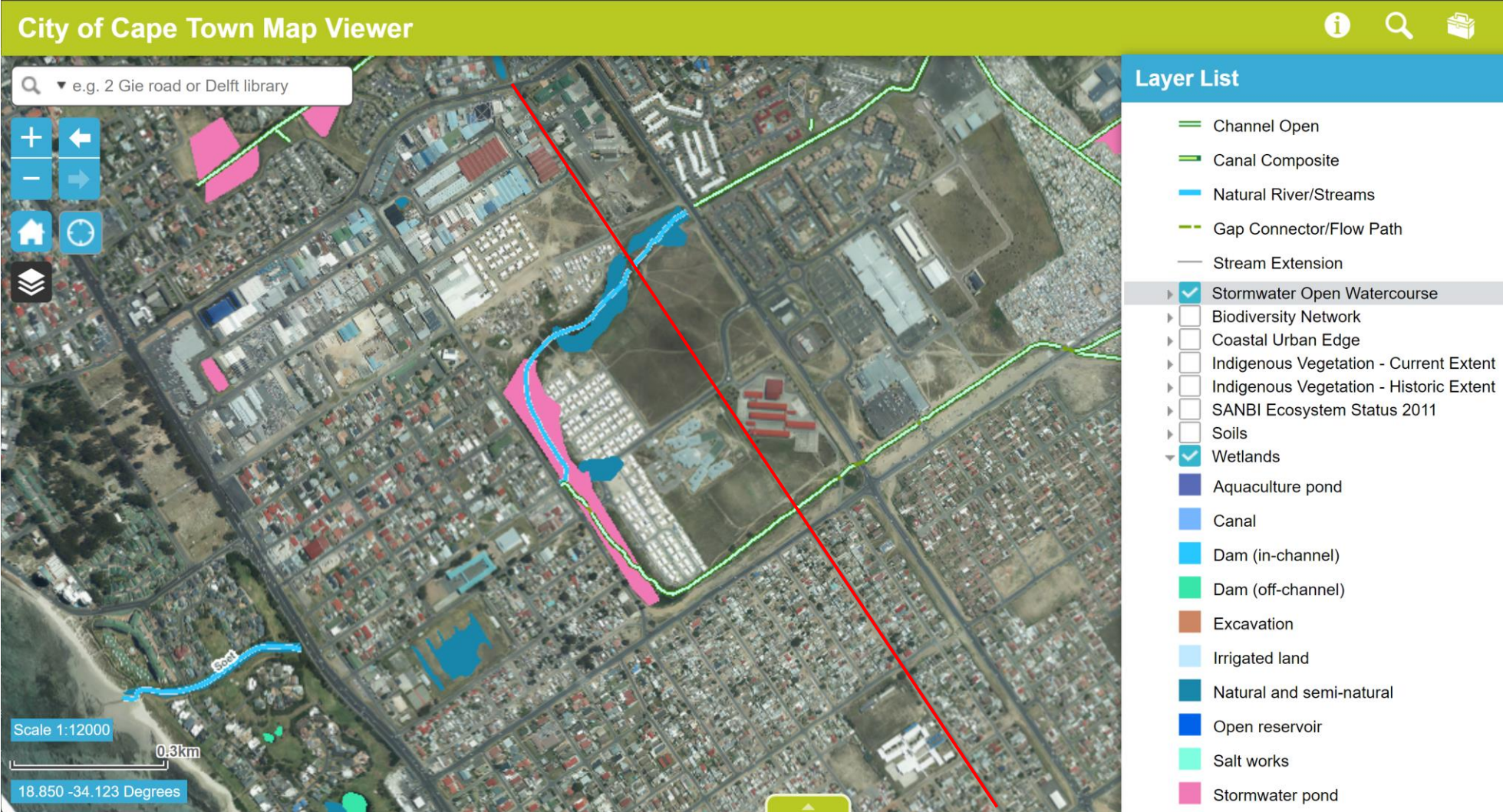


Figure 9. The City of Cape Town’s stormwater and wetland mapping in the vicinity of the site (red line) (City of Cape Town Map Viewer, 2024)

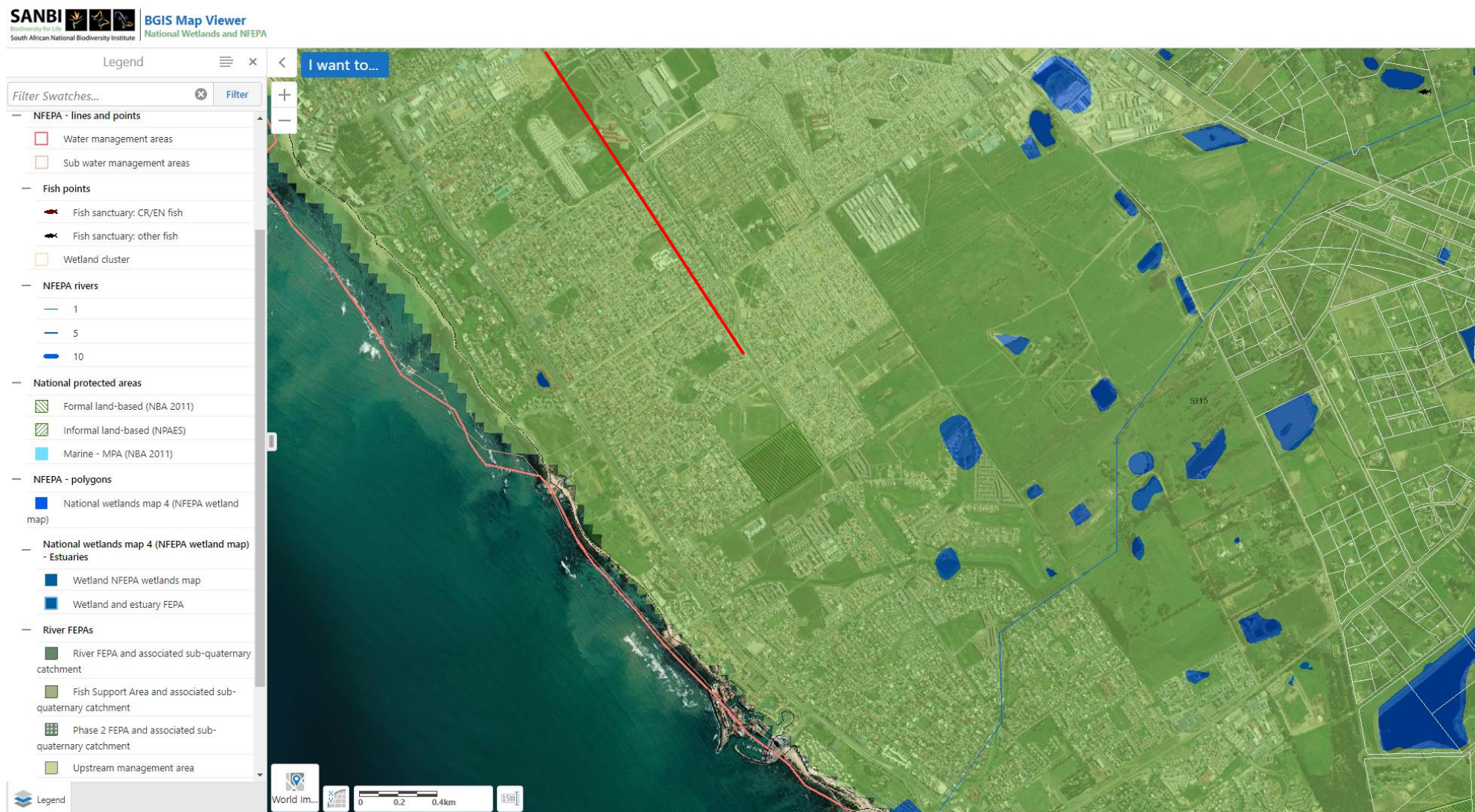


Figure 10. National Freshwater Ecosystem Priority Areas Rivers and Wetlands within the wider vicinity surrounding the site (red line) (CSIR NFEPA rivers 2011 obtained from SANBI BiodiversityGIS, 2024)

3.7. LAND USE

The pipeline is located within a residential area between the urban areas of Strand and Gordons Bay. The land cover is currently mapped along the pipeline is mapped as residential informal (low veg/grass).



Figure 11. Landcover map showing the land cover in and adjacent to the site (DEA, 2018 downloaded from CapeFarmMapper, 2024)

The property is mapped within the City of Cape Town Spatial Development Plan for the Helderberg District (Figure 12) as open space and the nearby Harmony Flats Nature Reserve as a Core 1 Biodiversity Conservation Area. The Sir Lowry's Pass River is mapped as Core 1 and Core 2 Biodiversity Conservation Areas, recognizing the importance of the river as an ecological corridor. The Soet River corridor is however not mapped as a biodiversity conservation area.

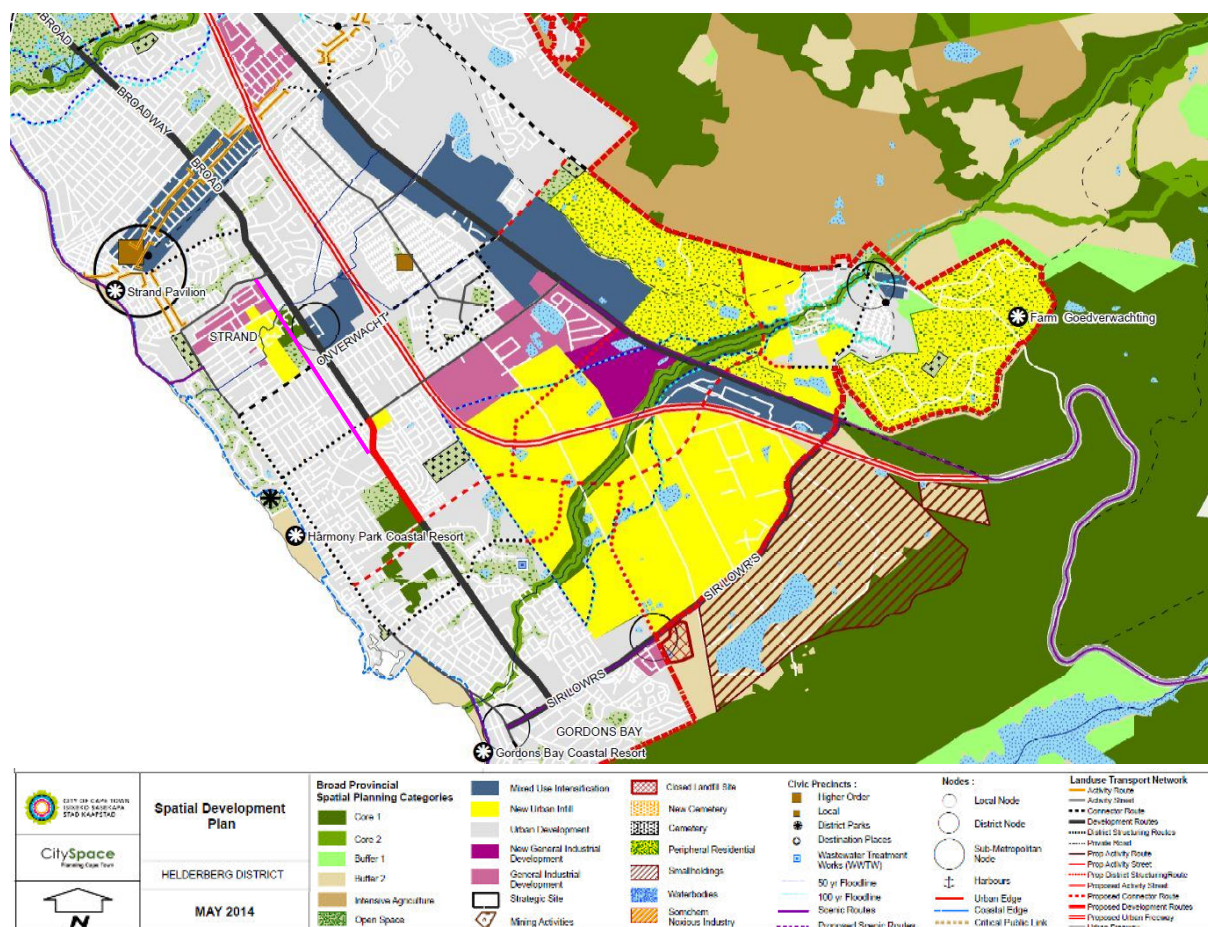


Figure 12. City of Cape Town Spatial Development Plan for the Helderberg District, with the location of the pipeline indicated by the pink line

4. ASSESSMENT OF AQUATIC FEATURES

In this section, the freshwater features at the study site are further described and assessed. The site has been significantly modified and most of the aquatic features on-site are artificial or are in a highly modified condition. They do however indicate that there is a fair amount of water moving across the site. In places, this flow is on the surface but there is also subsurface flow. Wherever impedance to this flow (such as at roads or berms), or where depressions have been created, temporary wetland habitat forms. The area is associated with the floodplain of the Soet River and naturally would have contained wide wetland areas.

4.1. HISTORICAL MODIFICATIONS

To better understand the aquatic features on the site, aerial photographs of the area captured in 1938, as well as more recent aerial imagery (2000 and 2023), were assessed to determine the modification to the aquatic features that have taken place over the past 80 years. Key changes to the land cover and the aquatic features as could be determined from the past aerial imagery are described below:

1938

The 1938 aerial image (Figure 13) shows the site before significant cultivation had taken place within the wider area the landscape and aquatic features were still largely natural. The meandering Soet River can be seen in the current location of the floodplain wetland area. Downstream of the area, the river was already significantly modified by cultivation.

2000

The aerial image captured in 2000 (Figure 14) shows the site in a slightly less developed condition to that of today. The secondary school had already been constructed but the surrounding area was less developed. The Soet River still followed a more natural meandering channel although disturbance of the area was already significant.

PRESENT DAY

The 2023 image of the site (Figure 15) reflects the current conditions of the aquatic habitats at the site. The river channel had been straightened and the habitat was much more dominated by permanent stormwater inundation with nuisance growth of *Phragmites australis* and *Typha capensis* within a more significant wetland area.



Figure 13. An aerial photograph captured in 1938 of the site (City of Cape Town Map Viewer, 2024)



Figure 14. An aerial image showing the site in April 2000 of the site (City of Cape Town Map Viewer, 2024)

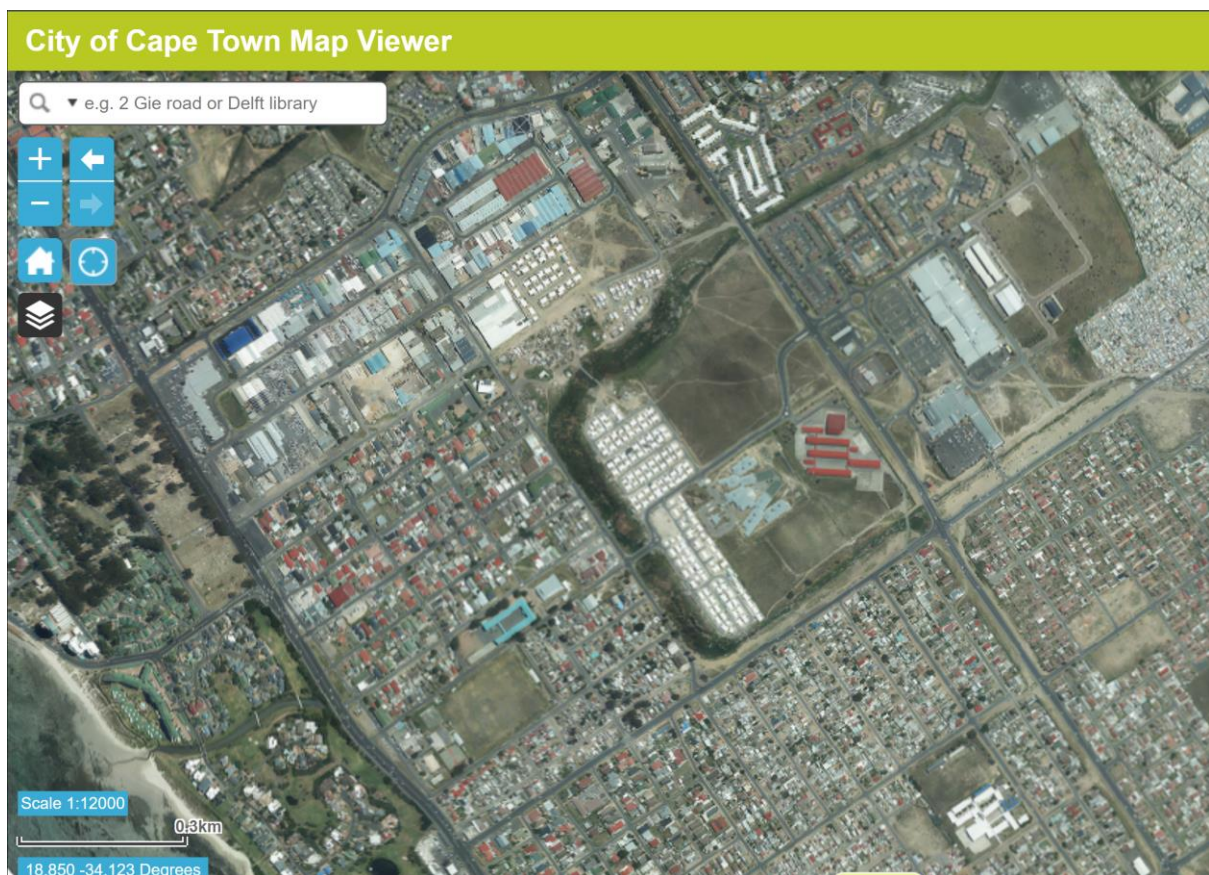


Figure 15. A recent aerial image (April 2023) of the site (City of Cape Town Map Viewer, 2024)

4.2. DESCRIPTION OF AQUATIC FEATURES

The aquatic features within or adjacent to the site comprise floodplain wetland habitats within the Morkel's Cottage open space.

WETLAND HABITAT

The only wetland habitats in the vicinity of the pipeline proposed to be maintained comprise floodplain wetlands associated with the Soet River. These wetlands are mostly stormwater-fed and receive significant litter from the adjacent developed areas. The dominant wetland vegetation comprises *Phragmites australis*, with patches of *Typha capensis*, typical of stormwater-fed urban wetlands.



Figure 16. View of the floodplain wetlands at Morkel's Cottage

4.3. PRESENT ECOLOGICAL STATUS OF THE WETLAND AREAS

4.3.1. WETLAND CHARACTERISATION

In South Africa, wetlands are defined as “...land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil” (National Water Act, Act No. 36 of 1998, (NWA) and Environmental Impact Assessment Regulations: Listing Notice 1 OF 2014 Government Notice R983 in Government Gazette 38282 dated 4 December 2014, as amended by Government Notice 327 in Government Gazette 40772 dated 7 April 2017). Wetlands are also included in the definition of a watercourse within the NWA, which implies that whatever legislation refers to watercourses will also apply to wetlands.

Only the seep wetland within the adjacent Harmony Flats Nature Reserve has been assessed as the wetland habitat occurring within the wider area that may be impacted by the proposed maintenance work. The wetland can be classified as follows:

Table 2: Classification of wetland areas within the study area

Name	Floodplain wetland
System	Inland
Ecoregion	Southern Folded Mountains Ecoregion
Landscape setting	Coastal floodplain
Drainage	Some surface and subsurface drainage
Seasonality	Seasonal
Anthropogenic influence	The wetlands on the site have been modified as a result of the development of the surrounding areas.
Geology	Surficial cover formed in situ on Malmesbury rocks
Terrestrial Vegetation	Lourensford Alluvium Fynbos
Dominant wetland vegetation	<i>Phragmites australis</i> and <i>Typha capensis</i>
Substrate	Loamy/clay soils
Salinity	Fresh

4.3.2. WETLAND HABITAT INTEGRITY

The Present Ecological Status (PES) Method (DWAf 2005) was used to establish the integrity of the wetland in the wider study area and was based on the modified Habitat Integrity approach developed by Kleynhans (DWAf, 1999; Dickens *et al*, 2003). Table 3 displays the criteria and results from the assessment of the habitat integrity of the wetlands. These criteria were selected based on the assumption that anthropogenic modification of the criteria and attributes listed under each selected criterion can generally be regarded as the primary causes of the ecological integrity of a wetland.

Table 3. Habitat integrity assessment criteria for palustrine wetlands (Dickens *et al*, 2003)

Criteria	Relevance	Score
Hydrologic		
Flow Modification	Changes in flow regime, volumes, velocity which affect inundation of habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to wetland.	2.0
Inundation	Impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.	2.0
Water Quality		
Water Quality Modification	From point or diffuse sources such as from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow..	1.8
Sediment Load Modif	Reduction due to entrapment by impoundments or increase due to land use practices. Cause of unnatural rates of erosion, accretion, infilling of wetlands and habitat change.	1.8
Hydraulic/Geomorphic		
Canalisation	Desiccation/change to inundation of wetland and habitat change.	2.0
Topographic Alteration	Consequence of infilling, ploughing, trampling, bridges, roads, railway lines and other substrate disruptive activities that reduce or change wetland habitat directly	2.0
Biota		
Terrestrial Encroachment	Desiccation of wetland and encroachment of terrestrial plants due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	2.0
Indig Veg Removal	Direct destruction of habitat through farming or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.	1.6
Invasive Plants	Affects habitat through changes in community structure and water quality changes.	2.2
Alien Fauna	Presence of alien fauna affecting faunal community structure.	2.0
Over use	Overgrazing, over fishing, etc.	2.2
Habitat Integrity		D/E

Table 4. Relation between scores given and ecological categories

Scoring Guidelines	Interpretation of Scores for all Attributes: Rating of Present Ecological Status Category (PESC)
Natural, unmodified – score=5.	CATEGORY A >4; Unmodified, or approximates natural condition.
Largely natural – score=4.	CATEGORY B >3 and ≤4; Largely natural with few modifications, but with some loss of natural habitats.
Moderately modified – score=3.	CATEGORY C >2 and ≤3; moderately modified, but with some loss of natural habitats.
Largely modified – score=2.	CATEGORY D ≤2; largely modified. Large loss of natural habitat & basic ecosystem function has occurred.
Seriously modified – rating=1.	CATEGORY E >0 and <2; seriously modified. Extensive loss of natural habitat & basic ecosystem function.
Critically modified – rating=0.	CLASS F 0; critically modified. Modification reached critical levels with system completely modified.

The floodplain wetland area is considered to be largely to seriously modified as a result of direct modifications to habitat as well as the development of the surrounding catchment.

4.4. ECOLOGICAL IMPORTANCE AND SENSITIVITY AND ECOSYSTEM SERVICES

The EIS assessment considers several biotic and habitat determinants surmised to indicate either importance or sensitivity. The determinants are rated according to a four-point scale (Table 5). The median of the resultant score is calculated to derive the EIS category (EISC in Table 6).

Table 5. Definition of the scale used to assess determinants presumed to indicate importance or sensitivity

Scale	Definition
1	One species/taxon judged as rare or endangered at a local scale.
2	More than one species/taxon judged to be rare or endangered on a local scale.
3	One or more species/taxon judged to be rare or endangered on a Provincial/regional scale.
4	One or more species/taxon judged as rare or endangered on a National scale (i.e. SA Red Data Books)

Table 6. Ecological importance and sensitivity categories (DWAF, 1999)

EISC	General description	Median
Very high	Delineations unique on a national and international level based on unique biodiversity. These rivers are very sensitive to flow modifications and have no or only a small capacity for use.	>3-4
High	Delineations considered unique on a national scale based on their biodiversity. These rivers may be sensitive to flow modifications but in some cases have substantial capacity for use.	>2-≤3
Moderate	Delineations considered unique on a provincial or local scale due to biodiversity. These rivers are not very sensitive to flow modifications and often have substantial capacity for use.	>1-≤2
Low/ marginal	Delineations not unique on any scale. These rivers are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

Table 7. Results of the EIS assessment for the seep wetland within the adjacent site

Biotic Determinants	Score
Rare and endangered biota	1
Unique biota	1
Intolerant biota	1
Species/taxon richness	1
Aquatic Habitat Determinants	
Diversity of aquatic habitat types or features	1
Refuge value of habitat type	2
Sensitivity of habitat to flow changes	1.5
Sensitivity of flow related water quality changes	1.5
Migration route/corridor for in-stream and riparian biota	1
National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs	1
EIS CATEGORY	Moderate

The wetland area as a valley bottom wetland within critically endangered Lourensford Alluvium Fynbos, has moderate ecological importance and sensitivity. Amphibians that are likely to occur within the wetland areas include painted reed frog (*Hyperolius marmoratus*), Raucous toad (*Sclerophrys capensis*), Cape sand frog (*Tomopterna delalandii*), Western rose rain frog *Breviceps rosei* ssp. *Rosei*, Grays stream frog (*Strongylopus grayii*) and Cape river frog (*Amietia fuscigula*). All of the amphibians are listed as being of Least Concern on the International Union for Conservation of Nature (IUCN) Red List.

4.5. WETLAND SERVICES

The assessment of the ecosystem services supplied by the wetland areas was conducted according to the guidelines described by Kotze *et al* (2005). An assessment was undertaken that examines and rates the services listed in Table 8. The characteristics were scored according to the general levels of services provided.

Table 8: Goods and services assessment results for wetlands (low=0 and high=4)

Goods and services	Floodplain wetland	Goods and services	Floodplain wetland
Flood attenuation	2.5	Biodiversity Maintenance	1.5
Stream flow regulation	1.0	Water supply	0.0
Sediment trapping	1.5	Natural resources	0.0
Phosphate trapping	2.0	Cultivated foods	0.0
Nitrate removal	2.3	Cultural significance	1.0
Toxicant removal	2.0	Tourism and recreation	1.0
Erosion control	1.0	Education and research	1.0
Carbon storage	2.0		

The wetland area on the site offers some valued goods and services, particularly in terms of stormwater mitigation.

4.6. RECOMMENDED AQUATIC ECOLOGICAL CATEGORY

The floodplain wetlands fall within DWS quaternary catchment G22K (Sir Lowry's Pass River) where the target ecological category is a C Category (moderately modified). The current condition of the wetlands is largely to seriously modified with a negative trend of deteriorating ecological conditions. Given the surrounding impacts of residential development, the ecological condition of moderately modified will not be achievable but considering the moderate ecological importance and sensitivity of the aquatic habitat type, it would be important to strive to improve the current ecological state where possible.

5. LEGISLATIVE REQUIREMENTS

The proposed maintenance works of the site needs to take cognisance of the legislative requirements, policies, strategies, guidelines and principles of the relevant regulatory documents of the City of Cape Town, such as the Spatial Development Framework, the City of Cape Town's Biodiversity Network Plan, the River Corridor and Floodplain Management Policy, as well as the National Water Act (NWA) and the National Environmental Management Act (NEMA).

5.1. CITY OF CAPE TOWN'S POLICIES AND STRATEGIES

FLOODPLAIN AND RIVER CORRIDOR MANAGEMENT POLICY (2009) AND MANAGEMENT OF URBAN STORMWATER IMPACTS POLICY (2009)

Watercourses and wetlands with their adjacent riparian areas and associated fauna and flora are protected from the impacts of adjacent development or activity by ecological buffers. Buffers provide continuous corridors and habitat for flora and fauna, as well as other benefits such as water quality improvement of point or diffuse sources of pollution, stream bank and erosion protection from the hydrological impacts associated with hardened catchments in urban areas, and space for implementation of appropriate water sensitive urban design elements. Determination of ecological buffer widths is based on the classification of the watercourse or wetland, its ecological condition and its importance and sensitivity. Buffer widths vary in width between 10 m and 40 m from "top of bank" watercourses, and up to 75 m from the outer edge of wetlands. The minor watercourse that is located adjacent to the new store is located approximately 15m from the watercourse with the fenced boundary approximately 5m from the stream.

Any new development must also take cognizance of the City's Stormwater Management Planning and Design Guidelines for New Developments (2009). To reduce the impacts of urban stormwater systems on receiving waters, all stormwater management systems within the City's area are required to be planned and designed following best practice criteria and guidelines laid down by the City, to support Water Sensitive Urban Design principles and the following specific sustainable urban drainage system objectives: Improve the quality of stormwater runoff; Control quantity and rate of stormwater runoff; and Encourage natural groundwater recharge.

CITY OF CAPE TOWN SPATIAL DEVELOPMENT PLAN (SDP) AND ENVIRONMENTAL MANAGEMENT FRAMEWORK (EMF)

A district SDP and EMF have been developed for the Helderberg District as a framework of policies and plans that will guide the physical development of the district. The objective of the SDP is to retain the rural/natural and unique character of the area by promoting peripheral residential development that may include rural living/ rural lifestyle estates. Recommendations specific to the site are as follows:

1. Conserve remnants of sensitive and threatened vegetation types;
2. Avoid the development of Critically Endangered vegetation remnants;
3. Consolidate and re-enforce the open space "green corridors", connecting biodiversity remnants where possible;
4. Introduce Indigenous landscaping into public open space,
5. Establish and maintain appropriate river and wetland buffers and prevent inappropriate land uses in these areas;
6. A detailed Environmental Management Programme (EMP) must be drawn up and implemented for all activities approved in these zones, following the City of Cape Town's specifications for EMPs;
7. A stormwater analysis is required to determine the extent and scale of activities that are or are not permitted;
8. Clear invasive vegetation within river corridors; and
9. Control illegal dumping and littering.

5.2. NEMA AND ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

NEMA is the overarching piece of legislation for environmental management in South Africa and includes provisions that must be considered to give effect to the general objectives of integrated environmental management. These provisions are contained in Section 24 (4)(a)(b) of the Act and will be considered during the EIA process. Activities listed in terms of Chapter 5 of NEMA in Government Notice No. R. 983, 984 and 985, dated 4 December 2014, as amended, trigger a mandatory Basic Assessment, or even a full scoping EIA process, before development. Many of the listed activities relate to activities within or adjacent to aquatic ecosystems. This report is intended to provide input into the adoption of a Maintenance Management Plan for works required on the pipeline through the site.

5.3. NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The purpose of the National Water Act, 1998 (NWA) is to provide a framework for the equitable allocation and sustainable management of water resources. Both surface and groundwater sources are redefined by the Act as national resources which cannot be owned by any individual and rights which are not automatically coupled to land rights, but for which prospective users must apply for authorisation and register as users. The NWA also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources.

The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21 of the NWA), which may impact water resources through the categorisation of 'listed water uses' encompassing water abstraction and flow attenuation within catchments as well as the potential contamination of water resources, where the DWS is the administering body in this regard. The water uses most likely to be associated with the proposed activities are as follows:

Reference in the NWA	Description	Comment
Section 21(c)	Impeding or diverting the flow of water in a watercourse	Works within the watercourses/wetlands are likely to trigger this water use
Section 21(i)	Altering the bed, banks, course or characteristics of a watercourse	Any works within or adjacent to any of the mapped aquatic features are likely to trigger this water use

Defined water use activities require the approval of DWS or the BGCMA in the form of a General Authorisation or Water Use Licence authorisation if not considered an existing lawful use (a water use that was lawful 2 years before the promulgation of the NWA in 1998) and a Schedule 1 use (small-scale/non-commercial level use). There are restrictions on the extent and scale of listed activities for which General Authorisations apply.

Section 22(3) of the National Water Act allows for a responsible authority (DWS) to dispense with the requirement for a Water Use Licence if it is satisfied that the purpose of the Act will be met by the grant of a licence, permit or authorisation under any other law.

GENERAL AUTHORISATION IN TERMS OF SECTION. 39 OF THE NWA

According to the preamble to Part 6 of the NWA, *"This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette..."* *"The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary..."*

The General Authorisations for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the NWA were last revised in 2023. The proposed

works within or adjacent to the wetland areas and river channels are likely to change the characteristics of the associated freshwater ecosystems and may therefore require authorization. Determining if a water use licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of the General Authorisations (GA). A risk assessment for the proposed project has been undertaken and is included in this report.

REGULATIONS REQUIRING THAT A WATER USER BE REGISTERED, GN R.1352 (1999)

Regulations requiring the registration of water users were promulgated by the Minister of DWA in terms of provision made in section 26(1)(c), read together with section 69 of the National Water Act, 1998. Section 26(1)(c) of the Act allows for registration of all water uses including existing lawful water use in terms of section 34(2). Section 29(1)(b)(vi) also states that in the case of a general authorisation, the responsible authority may attach a condition requiring the registration of such water use. The Regulations (Art. 3) oblige any water user as defined under section 21 of the Act to register such use with the responsible authority and effectively apply for a Registration Certificate as contemplated under Art.7(1) of the Regulations.

6. AQUATIC ECOSYSTEM IMPACT AND RISK ASSESSMENT

6.1. AQUATIC IMPACT ASSESSMENT

Repairs and periodic maintenance are necessary on the bulk water pipeline within the Morkel's Cottage area. The project works would entail excavations and opening along the pipeline length in stages to caulk the joints on the 810mm pipeline. The pipeline is approximately 2 235m in length and is located largely within residential areas along Power Street and 11th Street in Strand. The central portion of the pipeline crosses through open space and the Strand Senior Secondary School on Erven 5822 RE, 1112 and 34477, Stellenbosch District. Valves that require maintenance are located directly adjacent to the floodplain wetland area associated with the Soet River.

The aquatic features along the pipeline and near the values comprise watercourse/stormwater channels associated with the Soet River and some associated floodplain wetlands. The watercourses and wetlands are highly modified (in a present ecological condition of largely to seriously modified). They are of moderate ecological importance and sensitivity as they still provide valuable habitat for biota and some services in the mitigation of urban stormwater quality and flow. It is recommended that the wetland areas associated with the Soet River at the pipeline be maintained where possible and that the ecological condition and functionality be improved. Provided the disturbance and potential impact of the required maintenance works in the wetlands at the pipeline are minimised and these areas rehabilitated, the significance of the potential impact would be low.

The following potential impacts to the floodplain wetlands and channels of the Soet River adjacent to the pipeline that could be expected, associated with the proposed maintenance activities are:

1. Localised water quality impacts during the maintenance;
2. Modified surface and subsurface flows to wetlands; and
3. Disturbance of aquatic habitat.

The following mitigation measures are recommended to reduce the potential impact of the proposed maintenance work on the adjacent Soet River floodplain wetlands:



Figure 17. Google Earth image showing the location of the pipeline in relation to the delineated aquatic features (blue line=watercourses and green polygons=wetland areas).

- Maintenance works within or within 10m of the delineated wetland areas should preferably take place during the drier months of the year (October/November to April).
- Before construction, plan access route and movement to and from the maintenance site – aim to use designated and existing access routes where available.
- Minimise the spatial extent of disturbance and the frequency of, or requirement for, maintenance activities within or within 10m of the delineated wetland areas. The disturbance footprint should be demarcated. No activities should take place outside of this area.
- Demarcation should be conducted in consultation with the contractor or persons responsible for the work to keep the disturbance area as small as possible.
- If excavation is required- remove topsoil and set it aside for post-construction rehabilitation. The stored topsoil should be at a designated stockpile area that is at least 10m from the wetland/watercourse edge, avoids disturbance of indigenous riparian or terrestrial vegetation and is easily accessible by a vehicle.

- If possible, use manual labour to do the maintenance works, particularly within the wetland areas along the pipeline.
- Mix any concrete, other materials or potential contaminants at least 10m away from the delineated aquatic features and transport them to a specific point of use without spilling;
- If water run-off with high suspended solids and turbidity is observed coming from the disturbed areas associated with the work, temporary sediment trapping mechanisms should be put in place downstream of the activity to filter water from the maintenance works (such as a silt curtain).
- Good housekeeping practices should be followed, such as the use of machinery which does not leak oils or other substances, and if applicable adequate waste disposal and removal, as well as the adequate provision and servicing of toilets. The site of the maintenance activity must be managed so that material (especially cement and fuel products) is not washed into the wetland/watercourse during storm events. Emergency spill kits should be kept on site.
- Any cleared sediment, vegetation or spoil material associated with the maintenance activity should be removed from the river channel to a suitable disposal site.
- The maintained infrastructure should not impact the shape and flow of the wetland/watercourse. Shape banks to have a gently sloping gradient down to the watercourse/wetland (the cutting of the banks, which is the current practice, is not encouraged); and
- All reasonable measures should be undertaken to ensure that the maintenance activities minimise any future erosion of the wetland/watercourse bed and banks.
- After the maintenance works are complete, any areas within the maintenance footprint that have been degraded from their condition before construction and as a result of the maintenance activities must be restored to their former condition. Disturbed areas should be revegetated with appropriate indigenous plant species. Suggested wetland plants for revegetation of disturbed areas are as follows:
 - More permanently wet areas: *Schoenoplectus scirpoides*, *Bolboschoenus maritimus*, *Eleocharis limosa*;
 - Wetland margins / seasonally wet areas: *Salix mucronata subsp. capensis*, *Senecio halimifolius*, *Psoralea pinnata*, *Calopsis paniculata*, *Cyperus textilis*, *Onyxitis stricta*, *Zantedeschia aethiopica*, *Ornithogalum thyrsoides*, *Wachendorfia thyrsiflora*, *Watsonia meriana*, *Paspalum urvillei*; and
 - The drybanks adjacent to the wetlands: a mix of indigenous shrubs and grasses such as *Salvia africana-caerulea*, *Pelargonium cucullatum*, *Nemesia barbata*, *Athanasia juncea*, *Bulbine cepacea*, *Carpobrotus acinaciformis*, *Carpobrotus edulis*, *Cynodon dactylon*, *Themeda triandra*, and *Asparagus rubicundus*.
- Monitor disturbed areas to determine if sufficient indigenous vegetation growth has been achieved. Manage weed infestations if required.
- Work areas and access routes should be monitored for erosion or growth of invasive alien vegetation. Inspections are to be undertaken at the end of the dry/low flow period and after the initial rainfall events.

Table 9. Impact table of the proposed maintenance of the pipeline on the delineated aquatic features

Potential impact and risk:	Proposed maintenance	No-Go Alternative
PLANNING, DESIGN AND CONSTRUCTION PHASE		
Nature of impact:	Aquatic Ecosystem impacts: Aquatic habitat modification and potential for some flow and water quality modification	-
Duration of impact:	Short term negative impacts	
Extent	Local	
Magnitude/Intensity	Medium to low	
Consequence of impact or risk:	Low - The impact will result in limited disturbance of aquatic habitat during maintenance activities	
Probability of occurrence:	Possible	
Degree to which the impact may cause irreplaceable loss of resources:	No loss	
Degree to which the impact can be reversed:	Reversible	
Indirect impacts:	Potential of increased growth of invasive vegetation and possibly erosion due to disturbance of aquatic habitat	-
Cumulative impact prior to mitigation:	Low / Very low	
Significance rating of impact prior to mitigation	Low negative	
Degree to which the impact can be avoided:	Moderate to high	
Degree to which the impact can be managed:	Moderate to high	
Degree to which the impact can be mitigated:	Moderate to high	
Proposed mitigation:	See above	-
Residual impacts:	None	-
Cumulative impact post mitigation:	Negligible	-
Significance rating of impact after mitigation	Negligible	-
Confidence	High	

In terms of cumulative impacts, the proposed development activities, if mitigated as recommended, are unlikely to result in any degradation in aquatic habitat within the site and surrounding area.

The No-Go alternative would result in no changes to the aquatic ecosystems within the site, or the surrounding area, from the current degraded state.

6.2. RISK ASSESSMENT

A risk assessment, summarised in Table 10, has been undertaken to inform the water use authorisation process and is included in this report in Appendix B. The government Notice (GN) 4167 of December 2023, as it relates to the National Water Act, 1998 (Act No. 36 of 1998) (NWA) was utilised to assess the risks associated with the required maintenance works along the bulk water pipeline.

Table 10. A summary of the risk assessment for the proposed development

PROJECT:		Morkel's Cottage Strand Pipeline Maintenance Works	
Name of assessor:	Antonia Belcher		
Date of assessment:		2024/06/15	
RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities (version 2.0): SUMMARY			
[ASSUMING THAT ALL PROPOSED IMPACT CONTROL MEASURES (AS STIPULATED IN PROJECT SPECS) ARE EFFECTIVELY IMPLEMENTED]			
Phase	Activity	Impact	Risk Ratings
CONSTRUCTION/REHABILITATION	Excavations and opening along the pipeline length in stages to caulk the joints on the 810mm pipeline	Habitat Disturbance	L
		Water quality impacts	L
	Repairs to valves within the wetland habitats	Habitat Disturbance	L
		Water quality impacts	L
	Other repair and maintenance activities	Habitat Disturbance	L
		Water quality impacts	L

Provided the recommended mitigation measures are implemented, the potential risks of the proposed activities would be low such that the proposed activities would fall within the ambit of the General Authorisation for Section 21(c) and (i) water use activities.

7. CONCLUSIONS AND RECOMMENDATIONS

The aquatic features along the pipeline and near the values comprise watercourse/stormwater channels associated with the Soet River and some associated floodplain wetlands. The required maintenance works adjacent to these aquatic features must be authorised through the GA registration process, in consultation with the Department of Water and Sanitation."

The watercourses and wetlands are highly modified (in a present ecological condition of largely to seriously modified). They are of moderate ecological importance and sensitivity as they still provide valuable habitat for biota and some services in the mitigation of urban stormwater quality and flow. These wetlands are included in the City of Cape Town wetland mapping, as an aquatic CBA in the WCBSP and in the National Wetland Map version 5. As a result, the wetlands are also indicated to be of very high sensitivity in the DFFE Screening Tool.

It is recommended that the wetland areas associated with the Soet River at the pipeline be maintained where possible and that the ecological condition and functionality be improved. Provided the disturbance and potential impact of the required maintenance works in the wetlands at the pipeline are minimised and these areas rehabilitated, the significance of the potential impact would be low.

The following mitigation measures are recommended to reduce the potential impact of the proposed maintenance work on the adjacent Soet River floodplain wetlands:

- Maintenance works within or within 10m of the delineated wetland areas should preferably take place during the drier months of the year (October/November to April).
- Before the maintenance works is undertaken, plan the access route and movement to and from the maintenance site – aim to use designated and existing access routes where available.
- Minimise the spatial extent of disturbance and the frequency of, or requirement for, maintenance activities within or within 10m of the delineated wetland areas. The disturbance footprint should be demarcated. No activities should take place outside of this area.
- Demarcation should be conducted in consultation with the contractor or persons responsible for the work to keep the disturbance area as small as possible.
- If excavation is required- remove topsoil and set it aside for post-construction rehabilitation. The stored topsoil should be at a designated stockpile area that is at least 10m from the wetland/watercourse edge, avoids disturbance of indigenous riparian or terrestrial vegetation and is easily accessible by a vehicle.
- If possible, use manual labour to do the maintenance works, particularly within the wetland areas along the pipeline.
- Mix any concrete, other materials or potential contaminants at least 10m away from the delineated aquatic features and transport them to a specific point of use without spilling;
- If water run-off with high suspended solids and turbidity is observed coming from the disturbed areas associated with the work, temporary sediment trapping mechanisms should be put in place downstream of the activity to filter water from the maintenance works (such as a silt curtain).
- Good housekeeping practices should be followed, such as the use of machinery which does not leak oils or other substances, and if applicable adequate waste disposal and removal, as well as the adequate provision and servicing of toilets. The site of the maintenance activity must be managed so that material (especially cement and fuel products) is not washed into the wetland/watercourse during storm events. Emergency spill kits should be kept on site.
- Any cleared sediment, vegetation or spoil material associated with the maintenance activity should be removed from the river channel to a suitable disposal site.
- The maintained infrastructure should not impact the shape and flow of the wetland/watercourse. Shape banks to have a gently sloping gradient down to the watercourse/wetland (the cutting of the banks, which is the current practice, is not encouraged); and
- All reasonable measures should be undertaken to ensure that the maintenance activities minimise any future erosion of the wetland/watercourse bed and banks.
- After the maintenance works are complete, any areas within the maintenance footprint that have been degraded from their condition before construction and as a result of the maintenance activities must be restored to their former condition. Disturbed areas should be revegetated with appropriate indigenous plant species. Suggested wetland plants for revegetation of disturbed areas are as follows:
 - More permanently wet areas: *Schoenoplectus scirpoides*, *Bolboschoenus maritimus*, *Eleocharis limosa*;
 - Wetland margins / seasonally wet areas: *Salix mucronata subsp. capensis*, *Senecio halimifolius*, *Psoralea pinnata*, *Calopsis paniculata*, *Cyperus textilis*, *Onyxitis stricta*, *Zantedeschia aethiopica*, *Ornithogalum thyrsoides*, *Wachendorfia thyrsiflora*, *Watsonia meriana*, *Paspalum urvillei*; and

- The drybanks adjacent to the wetlands: a mix of indigenous shrubs and grasses such as *Salvia africana-caerulea*, *Pelargonium cucullatum*, *Nemesia barbata*, *Athanasia juncea*, *Bulbine cepacea*, *Carpobrotus acinaciformis*, *Carpobrotus edulis*, *Cynodon dactylon*, *Themeda triandra*, and *Asparagus rubicundus*.
- Monitor disturbed areas to determine if sufficient indigenous vegetation growth has been achieved. Manage weed infestations if required.
- Work areas and access routes should be monitored for erosion or growth of invasive alien vegetation. Inspections are to be undertaken at the end of the dry/low flow period and after the initial rainfall events.

The risk of the proposed activities altering the ecological status of the aquatic habitat within and adjacent to the site is considered to be low for the planned repairs and periodic maintenance works such that the proposed activities would fall within the ambit of the General Authorisation for Section 21(c) and (i) water use activities.

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APPENDIX A: PRESENT ECOLOGICAL STATE OF THE SIR LOWRY'S PASS RIVER (DWAf, 2012)

SELECT SQ REACH	SQR NAME	LENGTH km	STREAM ORDER	PES ASSESSED BY EXPERTS? (IF TRUE="Y")	REASONS NOT ASSESSED	PES CATEGORY DESCRIPTION	PES CATEGORY BASED ON MEDIAN
G22K-09315	Sir Lowrys Pass	13.20	1	Y		SERIOUS MODIFICATION	E
MEAN EI CLASS	MEAN ES CLASS	DEFAULT ECOLOGICAL CATEGORY (DEC)	RECOMMENDED ECOLOGICAL CATEGORY (REC)				
MODERATE	HIGH	B	0.00				
PRESENT ECOLOGICAL STATE		ECOLOGICAL IMPORTANCE			ECOLOGICAL SENSITIVITY		
INSTREAM HABITAT CONTINUITY MOD	SERIOUS	FISH SPP/SQ	1.00	INVERT TAXA/SQ	44.00	FISH PHYS-CHEM SENS DESCRIPTION	MODERATE
RIP/WETLAND ZONE CONTINUITY MOD	SERIOUS	FISH: AVERAGE CONFIDENCE	5.00	INVERT AVERAGE CONFIDENCE	4.82	FISH NO-FLOW SENSITIVITY DESCRIPTION	MODERATE
POTENTIAL INSTREAM HABITAT MOD ACT.	LARGE	FISH REPRESENTIVITY PER SECONDARY: CLASS	VERY LOW	INVERT REPRESENTIVITY PER SECONDARY, CLASS	HIGH	INVERT PHYS-CHEM SENS DESCRIPTION	VERY HIGH
RIPARIAN-WETLAND ZONE MOD	SERIOUS	FISH REPRESENTIVITY PER SECONDARY: CLASS	VERY LOW	INVERT RARITY PER SECONDARY: CLASS	VERY HIGH	INVERTS VELOCITY SENSITIVITY	VERY HIGH
POTENTIAL FLOW MOD ACT.	LARGE	FISH RARITY PER SECONDARY: CLASS	FALSE	ECOLOGICAL IMPORTANCE: RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX FISH) RATING	HIGH	RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX FISH) INTOLERANCE WATER LEVEL/FLOW CHANGES DESCRIPTION	VERY HIGH
POTENTIAL PHYSICO-CHEMICAL MOD ACTIVITIES	SERIOUS	ECOLOGICAL IMPORTANCE: RIPARIAN-WETLAND-INSTREAM VERTEBRATES (EX FISH) RATING	HIGH	HABITAT DIVERSITY CLASS	HIGH	STREAM SIZE SENSITIVITY TO MODIFIED FLOW/WATER LEVEL CHANGES DESCRIPTION	HIGH
		RIPARIAN-WETLAND NATURAL VEG RATING BASED ON % NATURAL VEG IN 500m (100%=5)	LOW	HABITAT SIZE (LENGTH) CLASS	MODERATE	RIPARIAN-WETLAND VEG INTOLERANCE TO WATER LEVEL CHANGES DESCRIPTION	HIGH
		RIPARIAN-WETLAND NATURAL VEG IMPORTANCE BASED ON EXPERT RATING	HIGH	INSTREAM MIGRATION LINK CLASS	LOW		
				RIPARIAN-WETLAND ZONE MIGRATION LINK	LOW		
				RIPARIAN-WETLAND ZONE HABITAT INTEGRITY CLASS	LOW		
				INSTREAM HABITAT INTEGRITY CLASS	MODERATE		

APPENDIX B: RISK ASSESSMENT

PROJECT:

Morkel's Cottage Strand Pipeline Maintenance Works

RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.0

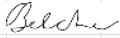
Name of Assessor:

Antonia Belcher

SACNASP Registration Number:

SACNASP 400040/10

Signature:



Date:

15-Jun-24

Risk to be scored for all relevant phases of the project (factoring in specified control measures). MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level										
			Name/s	PES	Ecological Importance	Abiotic Habitat (Drivers)			Biota (Responses)																					
						Hydrology	Water Quality	Geomorph	Vegetation	Fauna																				
CONSTRUCTION/REHABILITATION	Excavations and opening along the pipeline length in stages to caulk the joints on the 810mm pipeline	Habitat Disturbance	Soet River wetlands	D/E	Moderate	1	2	1	2	2	4	1	2	7	3	21	80%	16.8	L	High										
		Water quality impacts	Soet River wetlands	D/E	Moderate	1	3	1	2	3	6	1	1	8	3	24	80%	19.2	L	High										
	Repairs to valves within the wetland habitats	Habitat Disturbance	Soet River wetlands	D/E	Moderate	1	1	1	1	1	2	1	2	5	3	15	60%	9	L	High										
		Water quality impacts	Soet River wetlands	D/E	Moderate	1	2	1	1	2	4	1	1	6	3	18	60%	10.8	L	High										
	Other repair and maintenance activities	Habitat Disturbance	Soet River wetlands	D/E	Moderate	2	3	2	2	2	6	1	2	9	3	27	60%	16.2	L	High										
		Water quality impacts	Soet River wetlands	D/E	Moderate	1	3	1	2	3	6	1	2	9	3	27	60%	16.2	L	High										